Conservation and Transformation of Energy

PS-6 The student will demonstrate an understanding of the nature, conservation, and transformation of energy.

PS-6.4 Use the formula W = Fd to solve problems related to work done on an object.
Taxonomy Level: 3.2-C Apply Procedural Knowledge

Key Concepts:
Work: Force, Displacement
Joule

Previous/Future knowledge: In the 6th grade students recognized that energy is the ability to do work (force exerted over a distance) (6-5.6). In Physical Science students will expand their concept of work by developing a mathematical understanding of the concept.

It is essential for students to
- Solve problems for any variables in the equation, W = Fd, (i.e. F=W/d or d=W/F) using data.
- Use dimensional analysis to determine the proper units using the SI system:
  - Force should be given in newtons;
  - Distance should be given in meters;
  - Work will be newton-meters or joules.
- The displacement should be in the direction of the force.

It is not essential for students to solve problems involving
- Input and output work of simple machines;
- Efficiency;
- Friction;
- Power.

Assessment Guidelines:
The objective of this indicator is to *use* the formula W = Fd to solve problems related to work, therefore, the primary focus of assessment is to apply the correct procedure to mathematically determine the one of the variables in the formula W =Fd in situations involving work.

In addition to *use*, assessments may require that students:
- *Recognize* the proper units for force, distance (displacement), and work;
- *Apply* dimensional analysis to determine the proper SI units for work.